AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the present application.

1-75. (Cancelled)

76. (Withdrawn) A therapeutical composition containing purified fraction(s) of at least two compounds being or containing a pathogen inhibiting oligosaccharide sequence selected from the pathogen receptors

as defined in the formula

$[Sacch1]_{m1}Gal\beta x(Fuc\alpha 4)_{m2}Glc[NAc]_{m3}[\beta 3Gal\{\beta 4Glc(NAc)_{n1}\}_{n2}]_{n3}[\beta R_2]_{n4}$ (I)

wherein x is linkage position 3 or 4, Sacch1 is GlcNAcβ3, Galα3, GalNAcβ4, Galα4, or

Neu5Xα3/6, in which X is independently either Ac or Gc;

n1, n2, n3, n4, m1, m2, and m3 are independently integers 0 or 1

with the provisions that m2 may be 1 only when x is 3, m1 is 0, and m3 is 1;

m3 may be 0 only when Sacch1 is Neu5Xα3, Neu5Xα6, Galα3, GalNAcβ4 or Galα4;

when n4 is 1, then m3 is 0 and n3 is 0, and

when n4 is 0, then m1 is 1, m2 is 1, or n3 is 1;

R_2 is a ceramide comprising a hydroxyl fatty acid or an analog of a ceramide comprising a hydroxyl fatty acid;

Sacch1 is Galα3 or GalNAcβ4 with the provision that when the composition contains at least two receptors according to formula (I), these have at least one different variable selected from the group consisting of Sacch1, x, m2, and n4 with the provision that two sialic acid receptors or two neolacto receptors cannot be selected;

with the provision that when Sacch1 is Galα4, Neu5Xα3, Neu5Xα6, or GalNAcβ4, the oligosaccharide sequence according to the formula I may be a partial oligosaccharide sequence Galα4Gal, Neu5Xα3Gal, Neu5Xα6Gal, or GalNAcβ4Gal; and

with the provision that when the composition contains only one receptor according to formula (I) then it is together with at least one alpha-hexose receptor as defined in the formula

$$Hex\alpha p[(Hex\alpha r)]_nHex \qquad (II)$$

wherein Hex is Gal or Man, n is independently 0 or 1, p and r are linkage position 3 or 6 between Man residues, with the provision that when Hex is Man, then p is 3 and then r is 6, and when p is 6, then r is 3, and when Hex is Gal, then p is 4 and n is 0, with the provision that when Hex is Gal, it is not with Galα4Gal-receptor according to the formula I.

77. (Withdrawn)The composition according to claim 76, wherein the terminal activating sequence is Galα4 and the composition comprises the partial epitope Galα4Gal and a Mannose receptor comprising the oligosaccharide sequence

$$Man\alpha 3[(Man\alpha 6)]_nMan,$$

wherein n is 0 or 1.

78. (Withdrawn)The composition according to claim 76 containing purified fraction(s) of at least two compounds being or containing a pathogen inhibiting oligosaccharide sequence selected from the pathogen receptors as defined by the formula

$[A1]_{m3}Gal\beta4Glc[\beta A2]_{n4}$ (Ib)

wherein m3 and n4 are independently integers 0 or 1;

wherein the natural type non-reducing end activator sequence A1 is selected from the group consisting of GalNAcβ4, Galα4, Neu5Xα3, Neu5Xα6, GalNAcβ3Galα4, Galβ3GalNAcβ4, Galβ4GlcNAcβ3, GlcNAcβ3Galβ4GlcNAc, Galβ3GlcNAcβ3, Neu5Xα3Galβ4GlcNAcβ3, Neu5Xα6Galβ4GlcNAcβ3, and Galβ3(Fucα3)GlcNAcβ3; and wherein X is independently either Ac or Gc, and A2 is a ceramide comprising a hydroxyl fatty acid or an analog of a ceramide comprising a hydroxyl fatty acid.

79. (Withdrawn) The composition according to claim 78, wherein A1 is selected from the group consisting of Galα4, Neu5Xα3, Neu5Xα6, Galβ4GlcNAcβ3 or Galβ3GlcNAcβ3.

80. (Withdrawn) The composition according to claim 76 containing purified fraction(s) of at least two compounds being or containing a pathogen inhibiting oligosaccharide sequence selected from the pathogen receptors as defined by the formula

$[Sacch1]_{m1}[Gal\beta x(Fuc\alpha4)_{m2}GlcNAc\beta3]_{m3}Gal\beta4Glc[\beta A2]_{n4}$ (Ic)

wherein x is linkage position 3 or 4, Sacch1 is GlcNAcβ3, Galα3, GalNAcβ4, Galα4, or

Neu5Xα3/6, in which X is independently either Ac or Gc;

n4, m1, m2, and m3 are independently integers 0 or 1,

with the provisions that m2 is 1 only when x is 3,

when Sacch1 is GlcNAcβ3, then m3 is 1 and x is 4, and

m3 may be 0 only when m1 is 1 or n4 is 1,

when n4 is 0, then m1 is 1 or m3 is 1;

A2 is a ceramide comprising a hydroxyl fatty acid or an analog of a ceramide comprising a hydroxyl fatty acid, and

with the provision that at least two receptors are selected so that these have at least one different variable selected from the group Sacch1, x, m2, n4, preferably with the provision that not two sialic acid receptors are selected.

81. (Withdrawn) The composition according to claim 76 containing purified fraction(s) of at least two compounds being or containing a pathogen inhibiting oligosaccharide sequence selected from the pathogen receptors as defined by the formula

$[Sacch1]_{m1}[Gal\beta xGlcNAc\beta 3]_{m3}Gal\beta 4Glc$ (Id)

wherein x is linkage position 3 or 4, Sacch1 is Galα4, Neu5Xα3 or Neu5Xα6, wherein X is independently either Ac or Gc;

m1, and m3 are independently integers 0 or 1,

with the provision that either m1 is 1 or m3 is 1,

with the provision that at least two receptors are selected so that these have at least one different variable Sacch1 or x, preferably with the provision that not two sialic acid receptors are selected.

82. (Withdrawn) The composition according to claim 81, wherein the oligosaccharide sequences are selected from the group consisting of Galα4Galβ4Glc, NeuNAcα3Galβ4Glc, NeuNAcα6Galβ4Glc, NeuNAcα3Galβ4GlcNAc, NeuNAcα6Galβ4GlcNAc, Galβ4GlcNAcβ3Galβ4Glc and Galβ3GlcNAcβ3Galβ4Glc.

83. (Withdrawn) The composition according to claim 76, wherein at least one sialylated oligosaccharide, preferably a bovine milk fraction comprising sialylated oligosaccharides, such as NeuNAcα3Galβ4Glc, NeuNAcα6Galβ4Glc or NeuNAcα6Galβ4GlcNAc, is used together with at least one neutral oligosaccharide, preferably Galα4Galβ4Glc, Galα4Gal, Galβ4GlcNAcβ3Galβ4Glc (LNnT) or Galβ3GlcNAcβ3Galβ4Glc (LNT).

84. (Withdrawn) The composition according to claim 81, wherein said pathogen inhibiting oligosaccharides comprise a mixture of two different types of oligosaccarides selected from the group consisting of globo-oligosaccharides, Neolacto-oligosaccarides, and sialyl-oligosaccharides, preferably Galβ4GlcNAcβ3Galβ4Glc, Galα4Galβ4Glc, and/or sialyllactoses.

85. (Withdrawn) The composition according to claim 76 comprising a purified fraction(s) of at least two compounds being or containing a pathogen inhibiting oligosaccharide sequence selected from at least two of the following groups of pathogen receptors:

a) actosylceramide receptors as defined in the formula

$R_1xGal\beta4Glc\beta R_2$ (X)

wherein x is linkage position 3 or 4, R_2 is a ceramide comprising a hydroxyl fatty acid or an analog of a ceramide comprising a hydroxyl fatty acid, and R_1 is Galα, Galβ, GalNAcβ, GlcNAcβ or a longer oligosaccharide comprising Galα, Galβ, GalNAcβ or GlcNAcβ at the reducing end or Neu5Xα, wherein X is Ac or Gc, with the proviso that when R_1 is GlcNAcβ or Neu5Xα then x is 3;

b) ganglio-receptors as defined in the formula

$[Gal\beta3]_{n1}GalNAc[\beta4Gal\{\beta4Glc\}_{n2}]_{n3}$ (XI)

wherein n1, n2 and n3 are independently integers 0 or 1, with the proviso that either n1 or n3 is 1, and with the proviso that no sialic acids are linked to the oligosaccharide sequence;

c) Galα4Gal-receptors as defined in the formula

$[GalNAc\beta3]_{n1}Gal\alpha4Gal\{\beta4Glc(NAc)_{n2}\}_{n3}$ (XII)

wherein n1, n2, and n3 are independently integers 0 or 1, and the GalNAc-residue is optionally further substituted by other monosaccharide residues;

d) lacto-receptors as defined in the formula

$Gal\beta3GlcNAc[\beta3Gal\{\beta4Glc(NAc)_{n1}\}_{n2}]_{n3}$ (XIII)

wherein n1, n2, and n3 are independently integers 0 or 1;

e) neolacto-receptors as defined in the formula

$[GlcNAc\beta3]_{n1}Gal\beta4GlcNAc[\beta3Gal\{\beta4Glc(NAc)_{n2}\}_{n3}]_{n4}$ (XIV)

wherein n1, n2, n3 and n4 are independently integers 0 or 1, when n1 is 1, the non-reducing terminal GlcNAc can be further substituted by a monosaccharide residue or an oligosaccharide;

f) fucosyl-receptors as defined in the formula

$$Gal\beta3(Fuc\alpha4)GlcNAc[\beta3Gal\{\beta4Glc(NAc)_{n1}\}_{n2}]_{n3} \quad (XV)$$

wherein n1, n2, and n3 are independently integers 0 or 1;

g) sialic acid-receptors as defined in the formula

$$Neu5X\alpha pGal\beta r[(Fuc\alpha s)]_{n1}Glc(NAc)_{n2} \quad (XVI)$$

wherein independently X is either Ac or Gc meaning that the sialic acic is either Neu5Ac or Neu5Gc, n1 and n2 are either 0 or 1, p is linkage position 3 or 6, r and s are linkage positions 3 or 4 with the proviso that when r is 3 then s is 4 and when r is 4 then s is 3;

h) mannose receptors as defined in the formula

$$Man\alpha p[(Man\alpha r)]_{n1}Man \quad (XVII)$$

wherein n is independently 0 or 1, p and r are linkage position 3 or 6 between the Man residues, with the proviso that when p is 3 then r is 6, and when p is 6 then r is 3.

86. (Withdrawn) The composition according to claim 85, wherein the pathogen receptor of group a) is selected from the group of receptor oligosaccharide sequences consisting of:

lactosylceramide, lactosylceramide comprising hydroxyl fatty acids, lactosylceramide with modified carbon 3 of a galactose residue and isoglobotriaocylceramide

87. (Withdrawn) The composition according to claim 85, wherein the pathogen receptor of group g) is selected from the group of receptor oligosaccharide sequences consisting of:

oligosaccharides with Neu5Xα3Galβ3(Fucα4)GlcNAc, Neu5Xα3Galβ4(Fucα3)GlcNAc, Neu5Xα3Galβ4(Fucα3)Glc, Neu5Xα3Galβ3GlcNAc, Neu5Xα3Galβ4GlcNAc, Neu5Xα3Galβ4Glc, Neu5Xα6Galβ4GlcNAc or Neu5Xα6Galβ4Glc structures

88. (Withdrawn) The composition according to claim 76, wherein at least one of said compounds is in monovalent form optionally being a glycosylamine or a glycosylamide or a methyl glycoside or a glycoside including other N-glycosides, C-glycosides or S-glycosides.

89. (Withdrawn) The composition according to claim 76, wherein at least one of said compounds is linked to a polyvalent carrier.

90. (Withdrawn) The composition according to claim 89, wherein said polyvalent carrier is a carbohydrate carrier or a particle carrier or a soluble carbohydrate carrier, or a particle carrier or a bacterial polysaccharide or part of bacterial polysaccharide also comprising the receptor oligosaccharide sequence, or a carbohydrate particle, a synthetic polymer particle or a cell, or an antigenic or immunostimulating carbohydrate conjugate.

91. (Withdrawn) The composition according to claim 76 further comprising one or several oligosaccharide sequences selected from the group of:

oligosaccharides comprising sequences Fucα2Gal, Fucα3GlcNAc, Fucα3Glc, NeuNAcα8NeuNAc, Fucα2Galβ3/4GlcNAc, Fucα2Galβ4Glc, Fucα2Galβ4(Fucα3)Glc, Galβ4(Fucα3)GlcNAc, Fucα2Galβ3/4(Fucα4/3)GlcNAc and ganglioseries ganglioside oligosaccharide sequences.

92. (Currently Amended) A method of treatment for a ~~bacterial~~ gastrointestinal infection, wherein a pharmaceutically or therapeutically or prophylactically effective amount of [[the]] a composition ~~of claim 76~~ containing purified fraction(s) of at least two compounds being or containing a pathogen inhibiting oligosaccharide sequence is administered to a subject in need of such treatment; wherein said oligosaccharide sequence is selected from the pathogen receptors

as defined in the formula

$[Sacch1]_{m1}Gal\beta x(Fuc\alpha 4)_{m2}Glc[NAc]_{m3}[\beta 3Gal\{\beta 4Glc(NAc)_{n1}\}_{n2}]_{n3}[\beta R_2]_{n4}$ (I)

wherein x is linkage position 3 or 4, Sacch1 is GlcNAcβ3, Galα3, GalNAcβ4, Galα4, or Neu5Xα3/6, in which X is independently either Ac or Gc;

n1, n2, n3, n4, m1, m2, and m3 are independently integers 0 or 1

with the provisions that m2 may be 1 only when x is 3, m1 is 0, and m3 is 1;

m3 may be 0 only when Sacch1 is Neu5Xα3, Neu5Xα6, Galα3, GalNAcβ4 or Galα4;

when n4 is 1, then m3 is 0 and n3 is 0, and

when n4 is 0, then m1 is 1, m2 is 1, or n3 is 1;

R_2 is a ceramide comprising a hydroxyl fatty acid or an analog of a ceramide comprising a hydroxyl fatty acid;

Sacch1 is Galα3 or GalNAcβ4 with the provision that when the composition contains at least two receptors according to formula (I), these have at least one different variable selected from the group consisting of Sacch1, x, m2, and n4 with the provision that two sialic acid receptors or two neolacto receptors cannot be selected;

with the provision that when Sacch1 is Galα4, Neu5Xα3, Neu5Xα6, or GalNAcβ4, the oligosaccharide sequence according to the formula I may be a partial oligosaccharide sequence Galα4Gal, Neu5Xα3Gal, Neu5Xα6Gal, or GalNAcβ4Gal; and

with the provision that when the composition contains only one receptor according to formula (I) then it is together with at least one alpha-hexose receptor as defined in the formula

$$Hex\alpha p[(Hex\alpha r)]_nHex \qquad (II)$$

wherein Hex is Gal or Man, n is independently 0 or 1, p and r are linkage position 3 or 6 between Man residues, with the provision that when Hex is Man, then p is 3 and then r is 6, and when p is 6, then r is 3, and when Hex is Gal, then p is 4 and n is 0, with the provision that when Hex is Gal, it is not with Galα4Gal-receptor according to the formula I.

93. (Cancelled)

94. (Previously Presented) The method according to claim 92, wherein said gastrointestinal infection causes diarrhea or traveller's diarrhea, children's diarrheas, persistent diarrhea, watery diarrhea, hemorrhagic colitis or haemolytic uremic syndrome.

95. (Previously Presented) The method according to claim 92, wherein said infection is caused by EPEC (enteropathogenic *Escherichia coli*), ETEC (enterotoxigenic *Escherichia coli)*, EHEC (enterohemorrhagic *Escherichia coli*), EIEC (enteroinvasive *Escherichia coli*) or EAEC (enteroaggregative *Escherichia coli*).

96. (Previously Presented) The method according to claim 92, wherein said infection is caused by *Vibrio* species including *Vibrio cholerae*, *Campylobacter* species including *Campylobacter jejuni*, intestinal eukariotic parasites including the *Entamobae* species, *Salmonella* including *Salmonella typhimurium*, *Shigella* species, *Aeromonas* species, zoonotic *Helicobacter* species, *Listeria* species or rotavirus or the cause of infection is not diagnosed.

97. (Currently Amended) The method according to claim [[91]] 92, wherein said subject is a human patient or an animal patient.

98. (Withdrawn) A method of improving food safety comprising a step of coating a food product with a composition according to claim 76.

99. (Withdrawn) A nutritional composition or a nutritional additive or infant formula comprising a purified fraction(s) of at least of two compounds as defined in claim 76 for prophylaxis or treatment of gastrointestinal infection optionally further comprising a probiotic microorganism or a prebiotic substance.

100. (Withdrawn) A product for inhibition of pathogens, especially diarrhea causing *E. coli*, *ex vivo* comprising a purified fraction(s) of at least of two compounds as defined in claim 76, wherein said product is selected from the group consisting of: a mouth hygiene product, a food coating product, a food preservative, or a topical, washing, or cosmetic product.

101. (Withdrawn) A method of analysis or diagnostics comprising a step of contacting a putative pathogenic or probiotic microbe with at least three pathogen receptors as defined in claim 76.

102. (Withdrawn) A method of analysis or diagnostics comprising a step of contacting a putative pathogenic or probiotic microbe with a receptor selected from the group consisting of:

lacto-receptors, neolacto-receptors, fucosyl-receptors, mannose receptors or sialic acid receptors

for analysis or diagnosis of pathogen or probiotic binding,

wherein the said receptors are

i) protein linked receptors and

ii) comprising a terminal non-reducing end oligosaccharide sequence present in the epithelium of human intestine, human stomach or human larynx.

103. (Withdrawn) A method for a search or design of bacteria binding oligosaccharide substances comprising a step of modelling the binding properties of the oligosaccharide receptors as defined in claim 76.

104. (Withdrawn) A diarrheagenic *E. coli* inhibiting substance according to the formula

$$[OS\text{-}(y)_p - (S)_q - (z)_r -]_nPO \qquad (SP1)$$

wherein PO is an oligomeric or polymeric carrier structure, OS is an oligosaccharide sequence according to the invention, n is an integer $\geq$ 1 indicating the number of oligosaccharide groups covalently attached to the carrier PO, S is a spacer group, p, q and r are each 0 or 1, whereby at least one of p and r is different from 0, y and z are linking groups, at least one of y and z being an O-hydroxylamine residue –O-NH- or –O-N=, with the nitrogen atom being linked to the OS and/or PO structure, respectively, and the other y and z, if present, is a chemoselective ligation group.

105. (New) The method according to claim 92, wherein the purified fraction(s) is/are purified or isolated oligosaccharide fraction(s) from natural or synthetic sources.

106. (New) The method according to claim 92, wherein the purified fraction(s) is/are purified to reduce inactive or harmful molecules.